

**ABSTRACT**

A method for fabricating a stitched CPP synthetic spin-valve sensor with in-stack stabilization of its free layer. The method can also be applied to the formation of a stitched tunneling magnetoresistive sensor. The free layer is strongly stabilized by magnetostatic coupling through the use of a longitudinal biasing formation that includes a ferromagnetic layer, denoted LBL, within the pillar portion of the sensor and a synthetic exchange coupled tri-layer within the stitched portion of the sensor. The tri-layer consists of two ferromagnetic layers, FM1 and FM2 separated by a coupling layer and magnetized longitudinally in antiparallel directions. A criterion for the magnetic thicknesses of the layers:  $[t(\text{LBL})+t(\text{FM1})]/t(\text{FM2})=70/90$  angstroms of CoFe insures a strong exchange coupling. The magnetization of the tri-layer is done in a low field anneal that does not disturb the previous magnetization of the ferromagnetic free layer.